switching power to said restraint control module from said main power source to said backup power source with a backup power supply control and driver circuit that is connected to a backup power source switching device, wherein said backup power source switching device is used to transfer power form said main power source to said backup power source.

REMARKS

Claims 1-31 are pending in the application. Claims 1, 12, 14 and 24 have been amended. No claims have been cancelled and no claims have been added.

Objection to the Specification:

The Examiner has objected to the specification because of informalities. The Examiner has indicated that the statement on page 6, line 25 is incorrect when comparing it to the drawing figure, and that element 14 is referred to as main power source, and main power supply. Applicants have amended the specification on page 6, lines 20 and 25, to correct these informalities, and accordingly, respectfully request that the Examiner reconsider and withdraw these objections.

Rejections Under 35 USC §102

The Examiner rejected Claims 1-4, 7, 12-14, 16, 18-20, and 24-28 under 35 USC §102(b) as being anticipated by U.S. Patent No. 4,811,190 issued to Kier et al. ("Kier"). In an embodiment of the present invention, a backup power supply for a restraint control module is provided. The backup power supply of the present invention includes a main power source, a backup power source, a boost converter control and driver circuit, and a backup power supply control and driver circuit. The main power source is connected to the backup power source charging circuit and to the restraint control module. The backup power source is connected to the backup power source charging circuit and to the restraint control module. The boost converter control and driver circuit is connected to a boost converter switching device. The backup power supply control and driver

circuit is connected to a backup power supply switching device that is, in turn, connected to the backup power source. Further, the boost converter control and driver circuit "turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup power source charging circuit during normal power operation."

As stated, in claim 12, a backup power supply system for a restraint control module is provided having a main power source, a backup power source charging circuit, a backup power source, a first means for switching, and a second means for switching. Further, the first means for switching includes "switching, at a predetermined duty cycle, said backup power supply charging circuit to charge said backup power source during normal operation."

In yet another embodiment of the present invention, as stated in claim 24, a method is provided for providing backup power for a restraint control module. The method includes powering said restraint control module, sensing power on said main power source, providing a boost converter control and driver circuit, charging a backup power source with a backup power source charging circuit, and switching power to said restraint control module from said main power source to said backup power source. Further, the method provides that "said boost converter control and driver circuit switches said boost converter switching device on and off at a predetermined duty cycle to thereby transfer energy to said backup power source when said main power source is operating within a predetermined nominal voltage range." Support for these claim amendments may be found, for example, in the specification on page 4, lines 26 -33 through page 5, lines 1-2.

Kier discloses a circuit for extending the operation of an electrical load after interruption of a power source. The circuit includes bulk capacitors charged by the power source and regulated to a predetermined voltage near their peak voltage rating. Further, the bulk capacitors are isolated from the power source capacitors during normal power source operation (column 3, lines 47-64). More specifically, a regulator regulates the current that is applied to charge the bulk capacitor. Further, a thermister operates at a constant level of resistance to allow quick charging of the bulk capacitor

from power source. After a time, the temperature of the thermister will rise due to self heating. The increasing resistance of the thermister tends to reduce the current fed to zenor diode. Thus, during this period, the combination of resistor, thermister and zenor diode provide a small current which is approximately constant with temperature to keep the capacitor charged to the predetermined voltage (column 4, lines 30-45). The Examiner contends that the boost converter control and driver circuit, of the present invention, is disclosed in Kier as the capacitive boost circuit 10 of Kier and that the boost converter switching device is disclosed in Kier as the switch circuit 20 of Kier. However, as stated in amended claim 1, the boost converter control driver circuit has the capability of turning the boost converter switching device on and off at a predetermined duty cycle. The capacitive boost circuit 10 and switch circuit 20 do not have this capability. More specifically, boost circuit 10 operates to charge the backup power source using the thermisters and the switch circuit 20 of Kier operates to isolate the bulk capacitors from the load during normal operation of the power source and connects them to the load when the power source is interrupted (column 3, lines 57-61). Thus, the boost converter control and driver circuit and the boost converter switching device are not disclosed in Kier. In other words, Kier does not disclose a boost converter control and driver circuit that turns a boost converter switching device on and off at a predetermined duty cycle to charge the backup power source with a backup power source charging circuit. Therefore, Kier does not anticipate claim 1 of the present invention.

With respect to claims 2-11, claims 2-11 ultimately depend from claim 1 and therefore are patentable for at least the same reasons as given above with respect to claim 1.

With respect to claim 12, claim 12 discloses a first means for switching at a predetermined duty cycle, the backup power supply charging circuit to charge said backup power source during normal power operation. As detailed above, Kier does not disclose such a switching device, that is capable of switching said backup power supply charging circuit at a predetermine duty cycle to charge the backup power source during

normal power operation. Therefore, Kier does not anticipate claim 12 of the present invention.

With respect to claims 13, 14, 16, 18-20, these claims ultimately depend from claim 12 and, therefore, are patentable for at least the same reasons as given above in support of claim 12.

With respect to claim 24, claim 24 provides a method for providing backup power to a restraint control module. Similarly to claims 1 and 12, claim 24 provides a step for charging a backup power source with a backup power source charging circuit connected to the main power source and the boost converter switching device wherein said boost converter control and driver circuit switches the boost converter switching device on and off at a predetermined duty cycle to thereby transfer energy to said boost power source when said main power source is operating within a predetermined nominal voltage range. As stated with respect to claims 1 and 12, in more detail above, Kier does not disclose devices or a method having this step for charging a backup power source. Therefore, Kier does not anticipate claim 24 of the present invention.

With respect to claims 25-28, these claims ultimately depend from claim 24 and therefore are patentable for at least the same reasons as stated above in support of claim 24.

Rejections Under 35 USC § 103

The Examiner rejected Claims 5, 6, 15, 17, 29, and 30 under 35 USC §103(a) as being unpatentable over Kier in view of U.S. Patent No. 5,639,676 issued to Hshieh et al. (Hshieh). Hshieh is directed to the fabrication of a trenched DMOS transistor. Hshieh does not disclose:

> "a boost converter control and driver circuit connected to a boost converter switching device that is connected to said backup power source charging circuit, wherein said boost converter control and driver circuit turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup power source charging circuit during normal power operation",

as stated in claim 1. Therefore, Hshieh and Kier taken together or separately do not teach or suggest claims 5 and 6, which ultimately depend from claim 1, for at least the same reason as given above in support of claim 1.

With respect to claims 15 and 17, Hshieh does not disclose: a "first means for switching, at a predetermined duty cycle, said backup power supply charging circuit to charge said backup power source during normal power operation", as stated in claim 12. Therefore, Hshieh and Kier taken together or separately do not teach or suggest claims 15 and 17, which ultimately depend from claim 12, for at least the same reason as given above in support of claim 12.

With respect to claims 29 and 30, Hshieh does not disclose:

> "charging a backup power source with a backup power source charging circuit connected to said main power source and said boost converter switching device, wherein said boost converter control and driver circuit switches said boost converter switching device on and off at a predetermined duty cycle to thereby transfer energy to said backup power source when said main power source is operating within a predetermined nominal voltage range",

as stated in claim 24. Therefore, Hshieh and Kier taken together or separately do not teach or suggest claims 29 and 30, which ultimately depend from claim 24, for at least the same reason as given above in support of claim 24.

The Examiner rejected Claims 9 and 22 under 35 USC §103(a) as being unpatentable over Kier in view of U.S. Patent No. 5,726,944 issued to Pelley, III et al. (Pelley). Pelley discloses an SRAM memory cell having a boosted voltage by a charge pump to reduce the soft error rate within the SRAM and to improve bit cell stability. Pelley does not disclose:

> "a boost converter control and driver circuit connected to a boost converter switching device that is connected to said backup power source charging circuit, wherein said boost converter control and driver circuit turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup power source charging circuit during normal power operation",

as stated in claim 1. Therefore, Pelley and Kier taken together or separately do not teach or suggest claim 9, which ultimately depend from claim 1, for at least the same reason as given above in support of claim 1.

With respect to claim 22, Pelley does not disclose: a "first means for switching, at a predetermined duty cycle, said backup power supply charging circuit to charge said backup power source during normal power operation", as stated in claim 12. Therefore, Pelley and Kier taken together or separately do not teach or suggest claim 22, which ultimately depend from claim 12, for at least the same reason as given above in support of claim 12.

The Examiner rejected Claim 11 under 35 USC §103(a) as being unpatentable over Kier in view of U.S. Patent No. 5,737,208 issued to Chen (Chen). Chen discloses an uninterruptible power supply system which can operate in parallel with a battery backup module. Chen does not disclose:

> "a boost converter control and driver circuit connected to a boost converter switching device that is connected to said backup power source charging circuit, wherein said boost converter control and driver circuit turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup power source charging circuit during normal power operation",

as stated in claim 1. Therefore, Chen and Kier taken together or separately do not teach or suggest claim 11, which ultimately depend from claim 1, for at least the same reason as given above in support of claim 1.

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SUMMARY

Pending Claims 1-31 as amended are patentable. Applicants respectfully request the Examiner grant early allowance of these claims. The Examiner is invited to contact the undersigned attorneys for the Applicants via telephone if such communication would expedite this application.

Respectfully submitted,

Dated: February 3, 2003

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APPENDIX A

1. (AMENDED) A backup power supply system for a restraint control module, comprising:

a main power source connected to a backup power source charging circuit and said restraint control module;

a backup power source connected to said backup power source charging circuit and said restraint control module;

a boost converter control and driver circuit connected to a boost converter switching device that is connected to said backup power source charging circuit, wherein said boost converter control and driver circuit [drives] turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup power source charging circuit during normal power operation; and

a backup power supply control and driver circuit connected to a backup power supply switching device that is connected to said backup power source, wherein said backup power supply control and driver circuit uses said backup power supply switching device to switch the source of power to said restraint control module from said main power source to said backup power source during a loss of power from said main power source.

12. (AMENDED) A backup power supply system for a restraint control module, comprising:

a main power source;

a backup power source charging circuit connected to said main power source;

a backup power source connected to said backup power supply charging circuit;

first means for switching, at a predetermined duty cycle, said backup power supply charging circuit to charge said backup power source during normal power operation; and

second means for switching the power being supplied to said restraint control module from said main power source to said backup power source in the event said main power source experiences a loss of power.

14. (AMENDED) The backup supply system of claim 12, wherein said first means comprises a boost converter control and driver circuit connected to a boost converter switching device, wherein said boost converter control and driver circuit [switches] turns said boost converter switching device on and off at a predetermined duty cycle to charge said backup power source with said backup charging circuit during normal power operation.

24. (AMENDED) A backup power supply system for a restraint control module, comprising:

powering said restraint control module with a main power source during normal operation;

sensing power on said main power source with main power monitoring circuit;

providing a boost converter control and driver circuit connected to a boost converter switching device;

charging a backup power source with a backup power source charging circuit connected to said main power source and said boost converter switching device, wherein said boost converter control and driver circuit [energizes] switches said boost converter switching device on and off at a predetermined duty cycle to thereby transfer energy to said backup power source when said main power source is operating within a predetermined nominal voltage range; and

switching power to said restraint control module from said main power source to said backup power source with a backup power supply control and driver circuit that is connected to a backup power source switching device, wherein said backup power source switching device is used to transfer power form said main power source to said backup power source.